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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/751,614 | 12/29/2000 | Phil Geng | 884.387US1 | 8591 |

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| EXAMINER |
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ALCALA, JOSE H

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| ART UNIT | PAPER NUMBER |
|----------|--------------|

2827

DATE MAILED: 02/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/751,614

Applicant(s)

GENG ET AL.

Examiner

Jose H Alcala

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Claims 1-17 withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non elected invention, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Drawings

2. The drawings are objected to because in Figure 8, the upper line of the land is not clear and should be clarified if the material of the solder ball comes in contact with the fill inside the via. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because it is more oriented to the method of making the device than to the actual invention. Correction is required. See MPEP § 608.01(b).
4. The disclosure is objected to because of the following informalities: The title is objected, because it is more oriented to the method of making the device than to the actual invention.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Mehr et al. (US Patent No. 5,936,848).

Regarding Claim 18, Mehr teaches a substrate (reference number 14) comprising a plurality of lands (reference number 24), each land having a geometric center (See figure 3), wherein each land has a via (reference number 30), therein that is offset with respect to the geometric center of the land.

Regarding Claim 19, Mehr teaches that each land has an edge, wherein each via has a geometric center (reference number 48), and wherein the geometric center of each via is in a region between the geometric center and the edge of its associated land. See figure 3.

Regarding Claim 20, Mehr teaches the geometric centers of vias of adjacent lands are offset in substantially the same direction. See figure 2.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 21-24, 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakemi et al. (US Patent No. 5,489,750) in view of Mehr et al. (US Patent No. 5,936,848).

Regarding Claim 21, Sakemi teaches an electronic assembly comprising: an integrated circuit package (reference number 1); and a substrate (reference number 20) having a plurality of lands (reference number 21), each land having a via (reference number 22), and each land being aligned with respect to a contact of the integrated circuit package. See figure 11A.

Sakemi fails to teach that the via is offset. Mehr teaches a substrate (reference number 14) comprising a plurality of lands (reference number 24), each land having an offset via (reference number 30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sakemi and Mehr in order to have a substrate having lands with offset vias, in order to reduce the formation of vapor inside the solder ball that can cause the solder ball to break and failure in electrical connection.

Regarding Claim 22, Sakemi fails to teach that there is a thermally expansive substance residing in the vias. The limitation that the via inhibits that substance from

causing adjacent contacts of the integrated circuit package to be bridged when the lands and contacts are subjected to heat is an intended use limitation and it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F.2d 1647 (1987).

Mehr teaches a thermally expansive substance (reference number 38) residing in the vias. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sakemi and Mehr in order to have a thermally expansive substance (reference number 38) residing in the vias, in order to cover the via and prevent solder from getting out.

Regarding claim 23, the combination of Sakemi and Mehr fails to explicitly teach that the thermally expansive substance comprises a volatile organic compound. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the thermally expansive substance comprising a volatile organic compound, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 24, the combination of Sakemi and Mehr, teaches that the thermally expansive substance forms a portion of a solder mask (reference number 38 of Mehr), but fails to explicitly teach that the thermally expansive substance comprises a volatile liquid. It would have been obvious to one having ordinary skill in the art at the

time the invention was made to make the thermally expansive substance comprising a volatile liquid, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Regarding claim 26, the combination of Sakemi and Mehr teaches that each land has a geometric center and an edge, and that each via has a geometric center, and wherein each via is formed with its geometric center in a region between the geometric center and the edge of a land. See figure 3 of Mehr.

Regarding claim 27, the combination of Sakemi and Mehr teaches that the geometric centers of vias of adjacent lands are offset from the geometric centers of such lands in the same direction. See figure 2 of Mehr.

Regarding Claim 28, Sakemi teaches an electronic system comprising an electronic assembly having an integrated circuit package (reference number 1), and a substrate (reference number 20) having a plurality of lands (reference number 21), each land being aligned with respect to a respective contact (reference number 3) of the integrated circuit package and comprising a via (reference number 22). See figure 11A

Sakemi fails to teach that the via is offset. Mehr teaches a substrate (reference number 14) comprising a plurality of lands (reference number 24), each land having an offset via (reference number 30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Sakemi and Mehr in order to have a substrate having lands with offset vias, in order to reduce the

formation of vapor inside the solder ball that can cause the solder ball to break and failure in electrical connection.

Regarding claim 29, the combination of Sakemi and Mehr teaches that each land has a geometric center and an edge, that each via has a geometric center, and that the geometric center of each via is in a region between the geometric center and the edge of a land. See figure 3 of Mehr.

Regarding claim 30, the combination of Sakemi and Mehr teaches that the geometric centers of vias of adjacent lands are offset from the geometric centers of such lands in the same direction. See figure 2 of Mehr.

9. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakemi et al. (US Patent No. 5,489,750) in view of Mehr et al. (US Patent No. 5,936,848) and further in view of Sherman (US Patent No. 5,784,262).

Regarding claim 25, the combination of Sakemi and Mehr teaches all the limitations of the instant claimed invention as stated supra for claim 21, but fails to explicitly teach that lands comprise a first group having vias offset in a first direction, and a second group having vias offset in a second direction.

Sherman teaches an arrangement of lands in a board to be used in a semiconductor package comprising a first group (reference number 40) having vias offset in a first direction, and a second group (reference number 42) having vias offset in a second direction.


It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combination of Sakemi and Mehr with the teachings

of Sherman and in order to have the lands comprising a first group having vias offset in a first direction, and a second group having vias offset in a second direction, in order to facilitate the signal trace routing, minimizing signal degradation.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references have some of the elements of the instant claimed invention: Acocella et al. (US Patent No 5,591,941), Miles et al. (US Patent No 5,535,101) and Howell (US Patent No 5,815,374).
11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jose H Alcala whose telephone number is (703) 305-9844. The examiner can normally be reached on Monday to Friday.
12. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3431 for regular communications and (703) 305-3431 for After Final communications.
13. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JHA
January 28, 2002


Klunio
Primary Examiner